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What is Artificial Intelligence?

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A B S T R A C T

Artificial intelligence (AI) is the ability of a machine or computer system to simulate and perform tasks that would normally require human intelligence, such as logical reasoning, learning, and problem solving. Artificial intelligence is based on the use of machine learning algorithms and technologies to give machines the ability to apply certain cognitive abilities and perform tasks on their own autonomously or semi-autonomously. Artificial intelligence is distinguished by its degree of cognitive capacity or by its degree of autonomy. By capacity it can be weak or limited, general or superlative. Due to its autonomy, it can be reactive, deliberative, cognitive, or totally autonomous. As artificial intelligence improves, many processes are becoming more efficient and tasks that seem complicated today will be performed more quickly and accurately.

Keywords: Artificial intelligence, Touring test, AI classification, weak AI, strong AI.

1. Conceptual definition of intelligence and artificial intelligence (AI)

There is a wide debate about the concept of human intelligence, but we can define it as the ability of an individual to reason, solve problems, understand concepts, and learn effectively. Intelligence also refers to a person's ability to adapt to the environment, to change, and to use available information to make informed decisions. Intelligence is a complex quality that includes a variety of mental and emotional abilities.

The existence, or not, of "different types" of intelligence is discussed. The American psychologist Howard Gardner launched the hypothesis almost 40 years ago that there are "differentiated intelligences" (Gardner, 1983): logical-mathematical intelligence, verbal-linguistic intelligence, visual-spatial intelligence, musical intelligence, bodily-kinesthetic intelligence, personal intelligence, interpersonal intelligence, intrapersonal intelligence, existential intelligence, and, finally, ecological intelligence. Based on the above, and based on repetition, many tend to cite it as a scientific fact, when, in practise and through various investigations (van der Ploeg, 2019), it has been shown that there is only "intelligence," and that this applies to different contexts.

On the other hand, the term "intelligence" is appropriate when it comes to artificial intelligence (AI), since it refers to the ability of a machine to reason, solve problems, and adapt to the environment, similar to how a human being does. (Chen & Chen, 2022). However, it is also important to note that intelligence in a machine may manifest differently from human intelligence, and there may be differences in the way AI is measured and evaluated (Stadlmann&Zehetner, 2021). In general, the term "intelligence" remains a useful concept for understanding machines' ability to reason and solve problems, though we may need to develop a new conceptual framework in light of the significant advances made in this area in the last two years.

Another relevant debate is whether the term "intelligence" applied to a machine is appropriate (De Cremer & Kasparov, 2021), because, in that case, a pocket calculator should also be called "smart". However, the main difference between a smart computing system and a calculator is that the former is designed to mimic intelligent human behavior, while the latter is only capable of performing basic mathematical calculations. An intelligent computer system is capable of learning and adapting to new situations, while a pocket calculator can only perform pre-programmed mathematical operations. Also, a smart machine is usually much more complex and powerful than a calculator, since it can handle a large amount of data and perform complex tasks.

AI, therefore, is the ability of a machine or computer system to simulate and perform tasks that would normally require human intelligence, such as logical reasoning, learning, and problem solving (Bartneck et al., 2021). AI is based on using machine learning algorithms and technologies to give machines the ability to act like they have certain cognitive skills and do tasks on their own or with some help. As AI develops more and more, it is

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expected that it can improve the efficiency of many processes and help people perform complex tasks faster and more accurately.

An algorithm is a set of steps or rules that are followed to solve a problem or perform a specific task. Algorithms are often used to perform calculations and process data automatically. Algorithms can be very simple, such as the set of steps to add two numbers, or they can be very complex, involving multiple steps and decisions. Algorithms are widely used in computing and technology and play an important role in the operation of many digital applications and services. Algorithms are also used in AI to allow machines to perform tasks autonomously or semi-autonomously. Machine learning algorithms are often used in AI to allow machines to learn on their own and improve their skills over time (Bleakley, 2020).

1.1. Turing-test

The so-called Turing test is a test designed by the British mathematician Alan Turing in 1950 to determine if a machine is capable of displaying human intelligence (Turing, 1950). The test consists of putting a person and a machine in situations in which both must answer questions posed by an interrogator. If the interrogator cannot distinguish the machine's responses from the person's, the machine is said to have passed the Turing test. Although the Turing test is a fascinating idea, some claim that it is not a reliable indicator of AI (Halpern, 2006).

One of the most common criticisms is that the Turing test is not an accurate measure of AI since it is based on a machine's ability to deceive a human and not on its actual ability to reason or solve problems autonomously. In addition, the Turing test does not take into account other important aspects of intelligence, such as creativity, empathy, and the ability to learn and adapt, which are some of the characteristics of the new AI (Stahl, 2021b).

However, one argument in favor of the Turing test could be that it is a standard way of assessing AI, as it provides a common framework for comparing the ability of machines with that of humans. Also, it can help figure out where machines are able to mimic human intelligence and where they still have trouble (Liao, 2020).

It is important to note that the Turing test is not the only way to determine if an artificial system is intelligent. There are other approaches to measuring AI, such as task-based approaches, which assess a machine's ability to perform specific tasks, or behavior-based approaches, which focus on how a machine behaves in real situations (Bryson, 2020). But we believe that any way of evaluating AI must take into account the complexity and diversity of intelligence in general as a capacity and skill while being able to adapt to advances in technology and understanding of intelligence. intelligence in a holistic way, that is, integral.

2. AI Classification

2.1. Based on your degree of cognitive ability

There are different types of AI, and they can be classified in various ways. A common way to classify AI is according to its degree of cognitive ability, and three main types can be distinguished:

2.1.1. Weak or limited artificial intelligence

Also known as "functional" artificial intelligence, this form of AI is designed to perform specific tasks efficiently, but it does not have the ability to reason in a generalized way or learn from new situations.

Weak or limited AI refers to a type of AI that is only capable of performing specific tasks and cannot adapt to new or unfamiliar situations. This form of AI focuses on solving specific problems and does not have the ability to generalise its behaviour to other problems or environments (Chen & Chen, 2022). Weak or limited AI is often used in systems that require repetitive work, for example, filtering email spam, making generalisations (labels) from a lot of information, making suggestions on streaming platforms, deciding what to buy on e-commerce sites, etc.

Even Alexa, the Amazon-developed hardware voice assistant that uses AI technology, is an example of weak AI, smart as it may seem. Alexa is designed to be used on smart home devices and is capable of responding to voice commands and performing tasks such as playing music, providing weather information, and setting reminders, but it is only designed to perform a specific set of tasks and does not have the ability to adapt to new or unfamiliar situations like other types of AI.

2.1.2. General or strong artificial intelligence (AGI)

This type of AI has the ability to perform a wide range of cognitive tasks, such as reasoning, learning, and problem solving, and can adapt to new situations and environments. General AI is different from weak or limited AI, which can only perform specific tasks and cannot adapt to new situations. General AI is so called because it focuses on developing computing systems that can perform a wide variety of tasks and come as close as possible to human intelligence (Stahl, 2021a).

An example of general or strong AI is a computer system that is capable of learning autonomously and adapting to new situations such as some lethal and non-lethal autonomous weapons that are capable of going in search of their target, differentiating it from others that are not are and decide the best time to attack. This is not fiction, these intelligent systems currently exist.

Another application of general AI is advanced personal assistance systems that can answer questions and performing tasks based on the user's needs, such as the GPT3 chatbot that generates text in a highly rational and adaptively intelligent way (Katrak, 2022). This allows the general AI to adapt to different situations and offer personalized assistance.

A strong AI means having an intellect on the same level as a human, so it should be able to understand, reason like a person and act accordingly,

under any circumstances. Many consider that strong AI does not yet exist, only in theory, however this should be a point of contention, unless self-awareness is considered to be part of human intelligence.

2.1.2. Artificial super intelligence (ASI)

Also known as "high-performance" AI, this type of AI has the ability to perform virtually any task that requires human intelligence and can outperform humans in terms of cognitive ability and learning ability (Tzimas, 2021).

The super AI is extremely powerful and is capable of performing complex tasks with a high degree of precision and efficiency. Super AI is often used in applications that require a high degree of data processing, such as data science and medical research.

An example of high-performance AI is a computer system that is capable of processing and analyzing large amounts of data quickly and accurately. For example, the navigation system of Tesla vehicles that are capable of driving autonomously.

Also, data science systems that use high-performance AI to analyze large data sets and extract valuable information that can be used to make decisions in a wide variety of fields, for example, collective facial recognition systems. Another high-performance AI application could be in medical research, where large sets of medical data are being analyzed and used to help scientists discover new ways to treat diseases, for example what Google is doing with DeepMind (Bory, 2019), a company he owns that has created AlphaFold that determines the genetic sequence of a protein to diagnose and treat diseases such as Alzheimer's, Parkinson's, Huntington's and cystic fibrosis, which are believed to be caused by proteins that do not fold correctly.

2.2. According to their degree of autonomy

Another common way to classify AI is according to its degree of autonomy, and four main types can be distinguished:

2.2.1. Reactive artificial intelligence

This type of AI is capable of performing specific tasks autonomously, but it does not have the ability to remember past events or anticipate future situations (Chen & Chen, 2022).

This means that reactive AI can only respond to specific situations as they occur and cannot use information from the past or future to make decisions or adapt to new situations.

For example, a robot that moves in a limited environment and avoids obstacles using sensors and collision detection algorithms can be considered a reactive AI (Zimmermann et al., 2021). The robot can move autonomously and avoid obstacles in real time, but it does not have the ability to remember where it was before or anticipate future obstacles, so it can only react to specific situations at that moment.

Reactive AI is a simpler and more limited type of AI than other types of AI, such as deliberative or cognitive AI, which have the ability to plan and adapt to new situations by using information from the past and future. However, reactive AI can be useful in situations where a quick and accurate response to specific situations is required, such as in the control of industrial robots or in the design of security systems.

Deep Blue, developed by IBM is a good example of reactive AI. Deep Blue was designed to play chess against humans, and used move search and evaluation algorithms to find the best move at any given time. Although Deep Blue was highly capable of playing chess autonomously and competing against humans, he did not have the ability to remember previous moves or anticipate future moves, so he could only react to the situation on the board at any given time, even though he did so. with surprising efficiency for his time, in fact, he beat world champion Garry Kasparov in 1997.

2.2.2. Deliberative artificial intelligence

This type of AI has the ability to plan and make decisions based on information from the environment and predetermined objectives. This means that you can analyze situations and choose actions that allow you to meet specific objectives, and you can adapt to changing environments using information from the past and the future (Buhmann&Fieseler, 2021).

For example, a deliberative AI system designed to control a robot that collects objects in an unknown environment can use planning and decision-making algorithms to analyze the environment, choose actions that allow it to collect the objects and avoid obstacles, and adapt to new situations you encounter along the way. The system can use information from the environment to plan your collection route and make decisions based on your goals and circumstances.

Deliberative AI is a more complex and advanced type of AI than reactive AI. Deliberative AI can be useful in situations where autonomous and adaptive decision-making is required, such as in the control of mobile robots or in the design of assistance systems in complex tasks (Patra et al., 2021).

One example is the robots already used to lift rock samples on Mars that belong to NASA's Mars Sample Return mission, which aims to collect samples from the red planet and return them to Earth for study. The mission includes several components, including a mobile robot called the Mars 2020 Perseverance Rover, which was sent to Mars in July 2021 to collect soil and rock samples (Tosca et al., 2022).

Another good example of the use of deliberative AI is Amazon, which uses robots called Kiva that move around its warehouses and approach the shelves where the products that need to be prepared for shipment are located. The robots use sensors and computer vision algorithms to identify products and lift them off the shelves and into a packing area, where the products are prepared for shipment. Kiva robots are capable of working autonomously and collaboratively and can quickly and accurately retrieve and handle products of different sizes and weights (Kanaan, 2020).

2.2.3. Cognitive artificial intelligence

This type of AI has the ability to mimic human cognitive functions, such as reasoning, learning, and perception, and can adapt to new situations and environments (Yang et al., 2018).

Cognitive AI is a type of AI that is characterized by its ability to mimic human cognitive functions, such as reasoning, learning, and perception, and by its ability to adapt to new situations and environments. This means that cognitive AI can process information in a similar way to how humans do (Fügener et al., 2022).

For example, a cognitive AI system designed to recognize images can use machine learning techniques and neural networks to analyze images and recognize objects, people, and scenes similar to how humans do, even more efficiently and accurately. The system can learn in changing environments, such as changes in lighting or perspective to improve its recognition ability and avoid errors in image recognition, natural language processing, or complex problem solving.

Dall-e mini (now known as Craiyones) is a good example of cognitive AI. Dall-e mini is a small version of the AI system called Dall-e, developed by OpenAI, which uses deep learning techniques and neural networks to generate images and text from input descriptions. Dall-e mini is capable of parsing input descriptions and generating images and text that imitate the style and content of the description accurately and creatively (Panton, 2022).

For example, if Dall-e mini is given a description such as "A dog wearing a top hat sitting on a wooden chair by a campfire", Dall-e mini can generate an image showing a dog wearing a top hat. drinking glass sitting on a wooden chair next to a campfire precisely. The image generated by Dall-e mini is similar to what a human would do (Crayon, 2022).

2.2.4. Autonomous artificial intelligence

This type of AI is capable of autonomously interacting with its environment, making decisions and learning from new situations, and can change its objectives and strategies depending on the circumstances (Matthews et al., 2021).

Autonomous AI is a form of AI in which a system is capable of making decisions and performing tasks without the need for human intervention. This means that an autonomous AI can work independently and does not need a human to provide instructions or control its behavior. Autonomous AI can be used in a wide variety of fields, from product manufacturing to autonomous driving (Morandín-Ahuerma, 2019).

A common example of autonomous AI is the autonomous driving of vehicles. Autonomous vehicles use a combination of sensors, cameras and navigation technology to be able to sense their surroundings and make decisions about how to move on the road. This allows autonomous vehicles to circulate safely without human intervention. Another example of autonomous AI is the use of robots to perform repetitive tasks in a factory, such as assembling products or manipulating objects. The robots can work autonomously and make decisions about how to handle each task.

In summary, AI can be classified according to its cognitive capacity and its degree of autonomy and can range from simple systems that perform specific tasks autonomously, to complex systems that can mimic and surpasshumans in terms of intelligence.

Conclusion

Artificial intelligence is the ability of a machine or computer system to simulate and perform tasks that require human intelligence, such as logical reasoning, learning, and problem solving. AI relies on the use of machine learning algorithms and technologies to enable machines to mimic certain cognitive abilities. As AI develops, it is expected that it can improve the efficiency of many processes and help people perform complex tasks more quickly and accurately.

AI is categorized in two ways: 1) Based on its degree of cognitive ability and 2) Based on their degree of autonomy. By its cognitive capacity we say that a system uses weak or limited artificial intelligence; general artificial intelligence; and/or super intelligence. Due to its degree of autonomy, AI can be reactive, deliberative, cognitive, or autonomous.

Intelligence, therefore, is the ability of a person or a machine to reason, solve problems, manage concepts and learn effectively. It doesn't matter who has intelligence, but what is capable of doing with it.

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